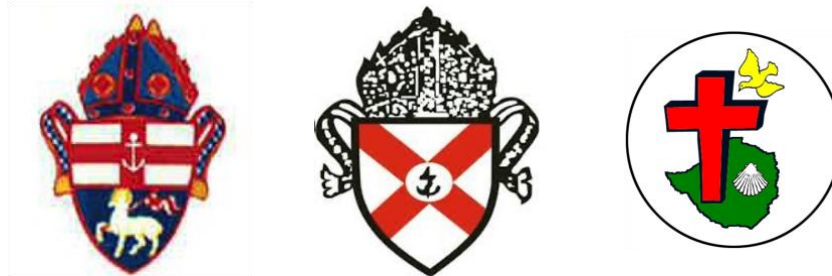




**J.C. FLOWERS
FOUNDATION**



Assessing malaria-related knowledge, attitudes, and practices among community members within the program areas of the Isdell:Flowers Cross Border Malaria Initiative

Results from 2023 KAP Survey within the program areas of

**The Anglican Diocese of Matabeleland,
The Anglican Diocese of Harare
and the
Methodist Church in Zimbabwe – Harare East District**

Isdell:Flowers Cross Border Malaria Initiative

Data collected between 18 April – 3 July 2023

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Abbreviations

CHW	community health worker
HH	household
IFCBMI	Isdell:Flowers Cross Border Malaria Initiative
IPTp	intermittent preventive treatment of malaria in pregnancy
IRS	indoor residual spraying
ITN	insecticide treated net
KAP	knowledge, attitudes, and practices
LLINs	long lasting insecticidal nets
MCA	malaria control agent
MRCZ	Medical Research Council of Zimbabwe
MoHCC	Ministry of Health and Child Care
NMCP	National Malaria Control Program
RCZ	Research Council of Zimbabwe
SBCC	social and behavioural change communication
VHW	village health worker

Section 1. Executive Summary

Through the Isdell:Flowers Cross Border Malaria Initiative (IFCBMI), the Anglican Diocese of Matabeleland, the Anglican Diocese of Harare, and the Methodist Church in Zimbabwe – Harare East District facilitate community engagement for malaria elimination in select communities in Matabeleland North, Mashonaland West, and Mashonaland East Provinces, in partnership with the Ministry of Health and Child Care (MoHCC)’s National Malaria Control Program (NMCP) and the J.C. Flowers Foundation. IFCBMI conducted this study to understand malaria-related knowledge, attitudes, and practices (“KAP”) within program areas through a yearly cross-sectional survey. The overall goal is to inform programmatic decisions based on local and recently collected data. The study’s main areas of inquiry are: use of and access to insecticide treated nets (ITNs); indoor residual spraying (IRS) coverage within 12 months prior to the survey; uptake of 3+ doses of intermittent preventive treatment of malaria in pregnancy (IPTp) among women who gave birth in the previous 12 months; patterns of care-seeking behaviour among children under five years with fever in the previous two weeks; knowledge of malaria symptoms and cause; and attitudes towards ITNs, IRS, and IPTp. This report presents key findings from the 2023 KAP Survey and select results from the 2021-2022 KAP Surveys for comparison. Results are representative of IFCBMI program areas and cannot be directly extrapolated to the District, Province, or National levels since IFCBMI program areas do not cover these administrative units in their entirety. However, these results can shed important light on the realities of malaria in these administrative units. A full listing of program areas included in the survey’s sampling frame can be found in Appendix 1. Below is a summary of the key 2023 KAP Survey Results:

Insecticide treated nets (ITNs)

Most households among program areas in Hwange and Kariba Districts owned at least one ITN (100% and 95%, respectively), but very few households own at least one ITN among program areas in Binga (35%), Hurungwe (24%), and Mudzi (36%) Districts. This is largely dictated by the type of primary vector control method assigned to each District. However, even in Hwange and Kariba Districts where ownership of at least one ITN was high, there are still many households that do not own enough ITNs to cover everyone in the households, assuming each ITN covers two people; only 77% of households in Hwange District program areas and 54% in Kariba District program areas own at least one ITN for every two people in the household.

Use of ITNs followed the same pattern as ITN ownership. The percent of people who used an ITN the previous night was higher among program areas in Hwange (96%) and Kariba (91%) Districts where ITN ownership was high, and lower in Binga (32%), Hurungwe (18%), and Mudzi (18%) District program areas where ITN ownership was low. However, even in areas with lower overall ITN use, almost all people who did have access to an ITN used it the previous night, suggesting that people will use nets if they have access to them.

Indoor residual spraying (IRS)

The World Health Organization (WHO) recommends that household IRS coverage reaches $\geq 85\%$ of households in a targeted area for IRS to be most effective. The percent of households that received IRS within 12 months prior to the 2023 KAP Survey exceeded the WHO recommended level among program areas in Binga, Hurungwe, and Kariba Districts. Program areas within Mudzi District just missed this benchmark, at 84% household IRS coverage within the prior 12 months. This indicator is not reported for Hwange District program areas, since Hwange District’s primary form of vector control is LLINs.

Care-seeking behavior for children under age five (<5) with fever

Across all Zimbabwe program areas, 76% of children <5 with fever in the two weeks prior to the 2023 KAP Survey sought care from a health facility or CHW within 24 hours of fever onset. Among children who sought care from a health facility or CHW (regardless of timing in relation to the fever onset), 92% received a malaria test, a significant increase from the previous survey year. 100% of children who tested positive for malaria reportedly received Coartem for malaria treatment.

Intermittent preventive treatment of malaria in pregnancy (IPTp)

Across all Zimbabwe program areas, 84% of respondents who gave birth within 12 months prior to the 2023 KAP Survey took 3+ doses of IPTp during their pregnancy, a statistically significant increase from the previous survey year. Coverage of IPTp 3+ could be improved within Mudzi District program areas, which reported the lowest uptake of IPTp 3+ among Zimbabwe program areas at 70%.

Knowledge and attitudes

Across all Zimbabwe program areas, 95% of respondents correctly identified “fever” or “feeling cold/chills” as a symptom of malaria, and 92% correctly identified the mosquito as the cause of malaria transmission (and listed nothing else incorrect). When asked about what actions one could take to protect oneself from malaria, 93% of respondents mentioned sleeping under ITNs and 68% mentioned accepting IRS. When asked about their attitudes toward ITNs, IRS, and IPTp as effective malaria prevention methods, 95%, 90%, and 95% (respectively) said the interventions “help a lot” to prevent malaria.

Section 2. Background

Through the Isdell:Flowers Cross Border Malaria Initiative (IFCBMI), the Anglican Diocese of Matabeleland, the Anglican Diocese of Harare, and the Methodist Church in Zimbabwe – Harare East District facilitate community engagement for malaria elimination in select communities in Matabeleland North, Mashonaland West, and Mashonaland East Provinces, in partnership with the Ministry of Health and Child Care (MoHCC)’s National Malaria Control Program (NMCP) and the J.C. Flowers Foundation. IFCBMI operates on the principle that malaria can be eliminated only if those most affected have the knowledge, skills, and resources to prevent and treat the disease and to advocate for its elimination.

The program supports a network of approximately 342 Community Health Workers (CHWs) and 76 malaria control agents (MCAs) who conduct community-based testing and treatment for malaria, where policy allows, and deliver malaria education and prevention services within their communities. Each CHW or MCA supports approximately 50-150 households. Religious leaders, teachers, and other influential community members support the efforts of this cadre and help to deliver malaria education within churches, schools, and the community as a whole.

IFCBMI received approval from the Medical Research Council of Zimbabwe (MRCZ) and the Research Council of Zimbabwe (RCZ) to conduct this study to gain a better understanding of malaria-related knowledge, attitudes, and practices (“KAP”) among community members living within IFCBMI Zimbabwe program areas. This study has three main areas of inquiry:

- 1) Knowledge: assess knowledge of the cause of malaria and its symptoms
- 2) Attitudes: understand attitudes toward ITNs, IRS, and IPTp
- 3) Practices: measure the reported use of and access to insecticide treated nets (ITNs) the night before the survey; reported household indoor residual spraying (IRS) coverage within 12 months prior to the survey; reported uptake of intermittent treatment of malaria in pregnancy (IPTp) among women who gave birth in the 12 months prior to the survey; and the reported trajectory of care for children under five years with fever in the two weeks prior to the survey

The KAP study collects data through a cross-sectional survey that is conducted yearly from 2021-2024, in order to understand change in the main areas of inquiry over time. The overall goal of this study is to improve programmatic decision-making and strategic action based on local and recently collected data. Data collected in the KAP study will also highlight opportunities to collaborate across borders with IFCBMI program areas in Namibia and Zambia. Study findings will also be shared with the NMCP, the MoHCC, and the academic community to contribute to the body of knowledge on malaria in these communities in Zimbabwe.

This document presents key results from the 2023 KAP Survey, with select results from the 2021-2022 KAP Surveys for comparison over time. Results are representative of IFCBMI program areas and cannot be directly extrapolated to the District, Provincial, or National levels, since IFCBMI program areas do not cover these administrative units in their entirety. However, these results can shed important light on the realities of malaria within these administrative units. A full listing of the IFCBMI Zimbabwe program areas included in the 2023 KAP Survey sampling frame can be found in Appendix 1.

Additional information about methodology, statistical analysis, and additional indicators can be available upon request.

Section 3. Methodology

Sampling frame and sample size

The sampling frame for the 2023 KAP Survey was all IFCBMI program areas in Zimbabwe (Appendix 1). The 2023 sample size was determined to be a minimum of 2500 households, based on power calculations intending to achieve at least 80% power to detect annual incremental improvements in the following primary outcome measures: the proportion of households that had one unused ITN and also at least one uncovered person the night before the survey, the proportion of women who gave birth in the previous 12 months that took 3+ doses of IPTp during their pregnancy, and the proportion of children <5 with fever in the prior two weeks who sought care from a health facility or CHW and did so within 24 hours of fever onset. Sample sizes for KAP Surveys of previous years were calculated in the same manner. Table 1 shows sample sizes from 2021-2023 KAP Surveys and Table 2 shows dates of data collection.

Table 1. Zimbabwe KAP Survey sample sizes (2021-2023 KAP Surveys)

Province	District	Sample sizes		
		2021	2022	2023
Matabeleland North	Binga	675	792	841
	Hwange	285	232	215
Mashonaland West	Kariba	117	147	127
	Hurungwe	250	150	131
Mashonaland East	Mudzi	810	470	1145
TOTAL		2137	1791	2459
Response rate		99.9%	99.9%	99.6%

Table 2. Dates of KAP Survey data collection (2021-2023 KAP Surveys)

Year	Dates of data collection
2021	15 April – 8 May
2022	21 April – 26 May
2023	18 April – 3 July

Household selection

Households were sampled by systematic random sampling. A “skip pattern” was calculated such that for a sampling frame of H households comprising IFCBMI Zimbabwe program areas, of which X are to be sampled, each ‘(H/X)-1’ household was surveyed until X households were reached. The first household surveyed in every village was selected randomly by drawing a number ‘N’ ranging from 1-10 and surveying the household that was ‘N’ households away from the starting point, which was always the headman’s household.

Survey respondents

All survey participants were required to be female, 18 years old or older, and provide verbal consent. If a household selected for the survey included more than one eligible woman, preference was given to the mother or caregiver of the youngest child in the household. Women were surveyed because they are typically the main caregivers of children under five (<5) and therefore are most likely to answer questions about care-seeking behaviour for their children accurately. They also are most likely to answer questions about their own IPTp history accurately.

Data analysis

Descriptive statistics were calculated for all indicators. Descriptive statistics weighted each household to account for its inverse probability of being included in the sample. Statistical tests were conducted to compare findings between 2022 and 2023 survey years and between 2021 and 2022 survey years. Differences in outcomes that are dichotomous at the individual household level were tested for significance using a regression of the outcome on an indicator for survey year. Differences in outcomes expressed as continuous percentages at the individual household level were tested with a linear regression of the outcome on an indicator for the survey year. The significance threshold was set at .05. Data was analyzed in STATA v 14.2.

Section 4. Results

Results are representative of IFCBMI program areas only and cannot be directly extrapolated to the District, Provincial, or National levels, since IFCBMI program areas do not cover these administrative units in their entirety. However, these results can shed important light on the realities of malaria within these administrative units. Some graphs show results from the 2023 KAP Survey compared to prior KAP Survey years (2021-2022), while other graphs only showcase 2023 KAP Survey results.

Results comparing data between two survey years only include data from program areas that were surveyed in both years being compared. In the sampling frame for the 2023 KAP Survey, there was one ward within Mudzi District, Chikwizo B, that had not been surveyed in prior years and thus data from households surveyed in that area (n=458) are not included in results that compare 2022-2023. The data from Chikwizo B ward are, however, included in descriptive results for the 2023 KAP Survey.

Table 3. Background characteristics, among all Zimbabwe program areas (2023 KAP Survey)

Background characteristic	
Average age of respondent (n)	30.5
Households with at least one child under 5 who slept there the previous night (%)	91%
Average number of children <5 in household the previous night, among households with at least one child <5 (n)	1.4
Households with at least one pregnant woman who slept there the previous night (%)	28%
Average number of people who slept in the household the prior night (n)	4.9
Average number of sleeping spaces (n)	2.5
Households with surrounding standing water, per visual observation of data collector (%)	14%

Table 4. Respondent education level, among all Zimbabwe program areas (2023 KAP Survey)

Education level	%
Never attended school	5%
Attended some primary school	8%
Completed primary school	20%
Attended some secondary school	31%
Completed secondary school	33%
Higher than secondary school	3%
Not sure	0%

Insecticide treated nets (ITNs)

All participants were asked about their household ITN ownership, intrahousehold access to ITNs, and use of ITNs among household members the night before the survey.

Figure 1. shows varying levels of household ITN ownership (2023 KAP Survey). There is distinct variation in household ITN ownership between District program areas, which reflect the primary vector control strategy assigned to each District. Hwange District’s primary vector control strategy is long lasting insecticidal nets (LLINs), while the vector control strategy of Binga, Hurungwe, Kariba, and Mudzi Districts is indoor residual spraying (IRS). Among program areas in Hwange District, 100% of households owned at least one ITN, and 77% owned at least one good condition ITN for every two people in the household. Among program areas in Kariba District, where the primary vector control strategy is IRS but which had an ITN distribution prior to the 2023 KAP Survey, 95% of households owned at least one ITN. Among program areas in Binga, Hurungwe, and Mudzi Districts, where IRS is the primary vector control strategy, few households owned at least one ITN and very few owned at least one good condition ITN for every two people in the household.

Figure 1. Percent of households owning ITNs in various quantities (2023 KAP Survey)

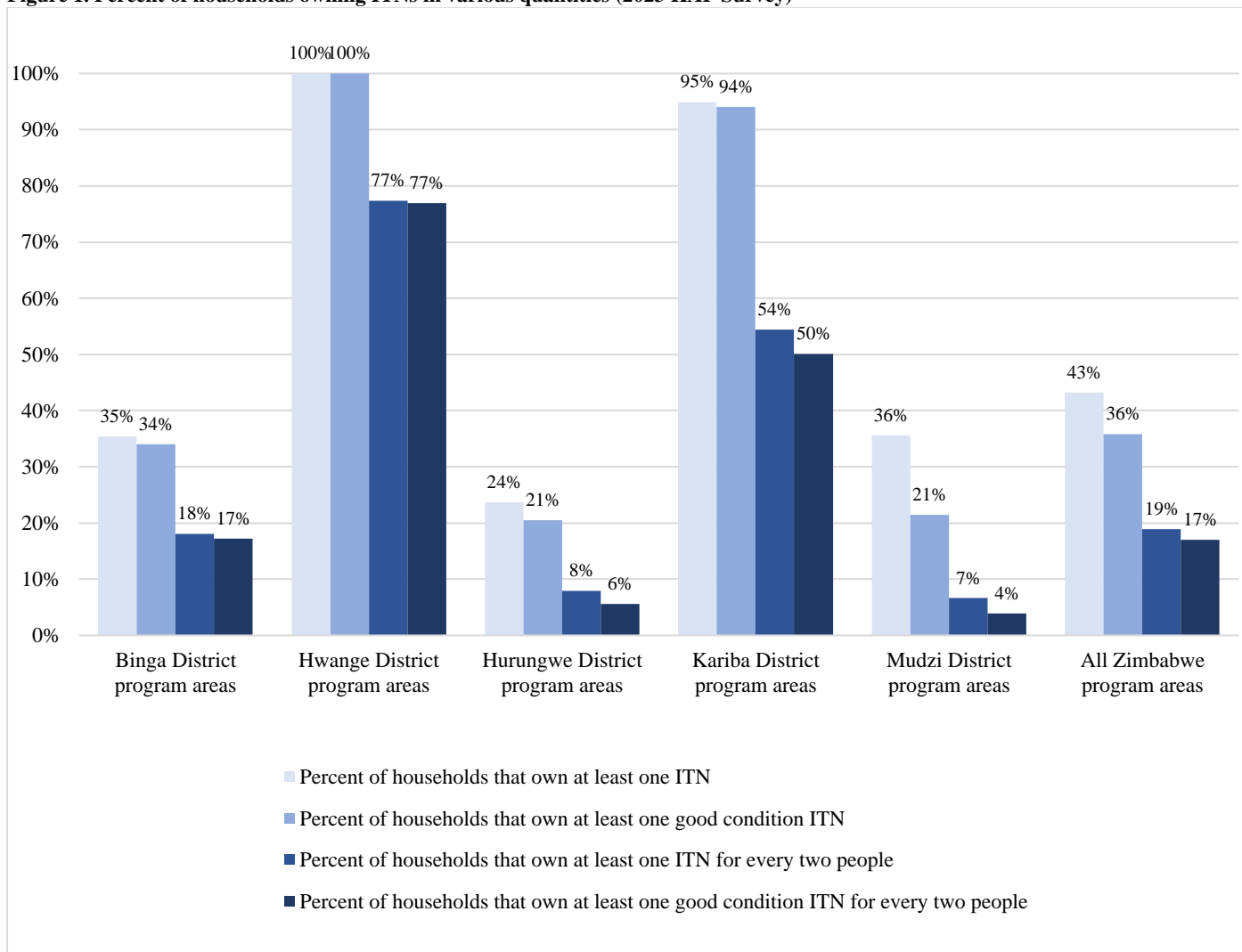


Figure 2. describes intrahousehold access to ITNs, which is the household average of the percent of people who had access to an ITN within their own household the night before the survey, assuming each ITN covers two people. In general, ITN access followed a similar pattern as ITN ownership. Among program areas in Hwange and Kariba Districts where household ITN ownership was higher, the percent of people who had access to an ITNs the previous night was also higher (94% and 85%, respectively). Among program areas in Binga, Hurungwe, and Mudzi Districts where household ITN ownership was lower, access to ITNs was also lower (29%, 16%, and 21%, respectively).

Figure 2. Percent of people (household average) who had access to an ITN within their own household the previous night, assuming each ITN covers two people (2023 KAP Survey)

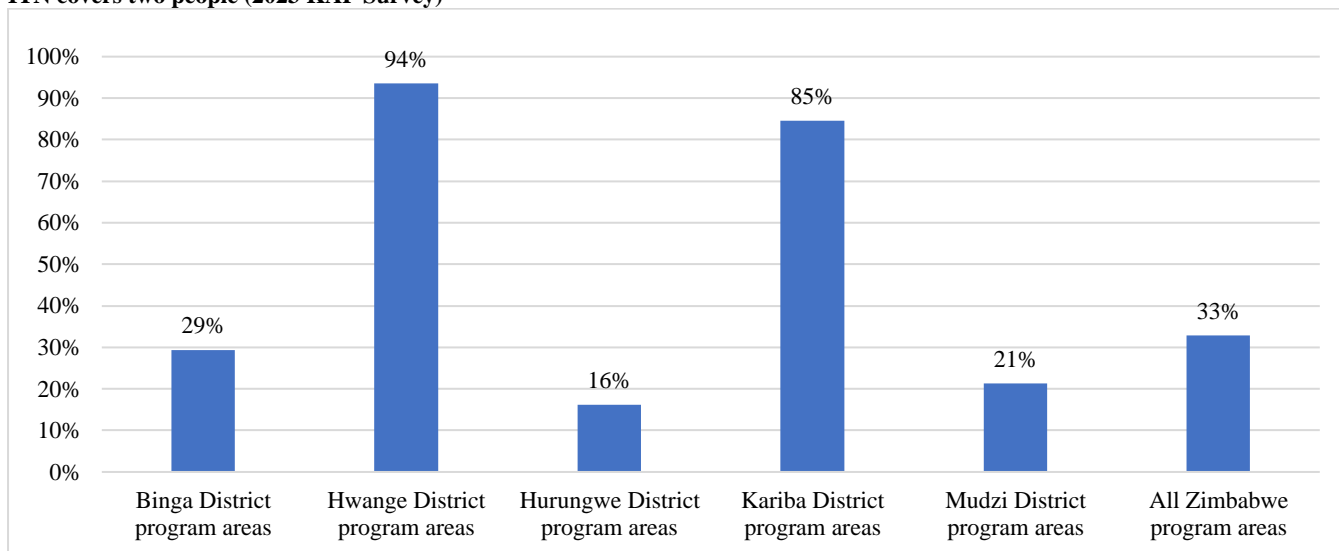
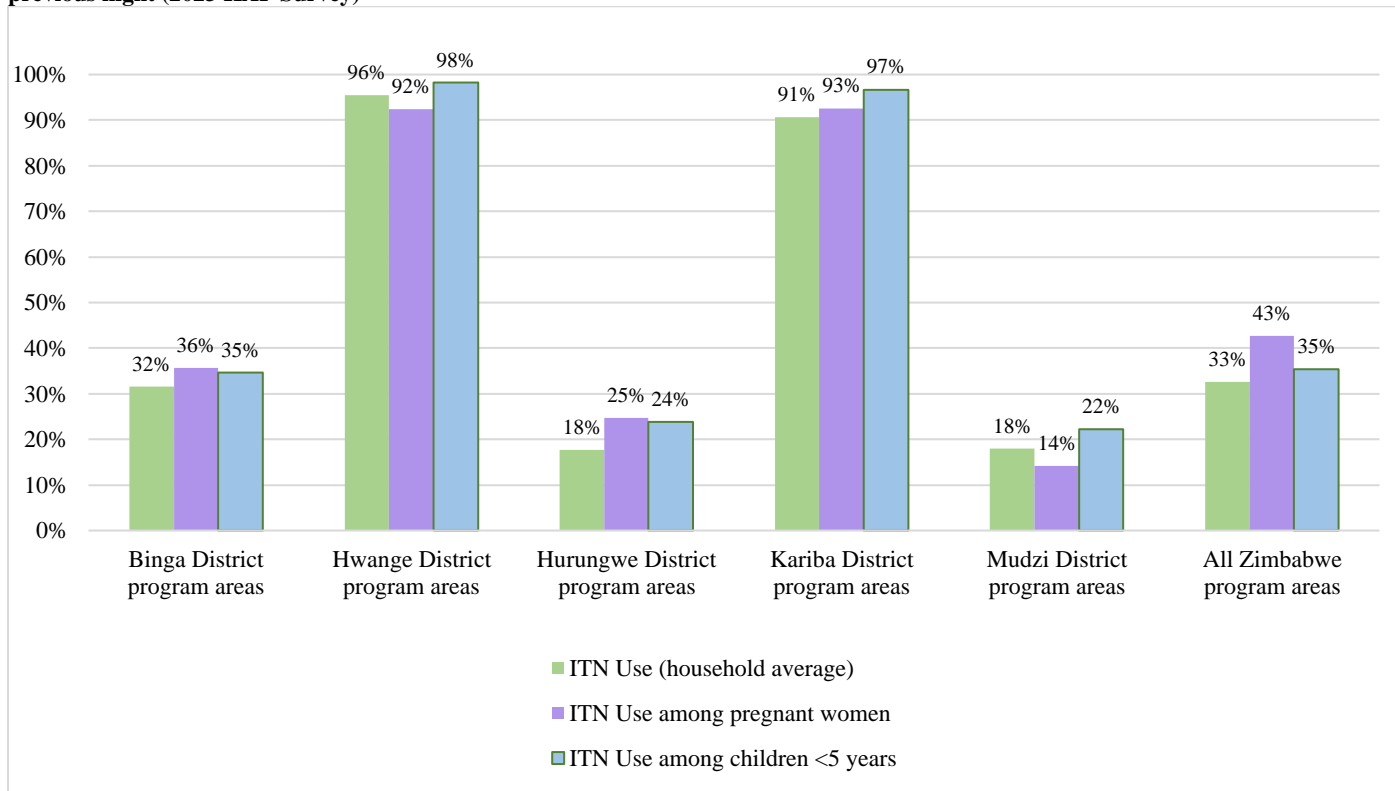


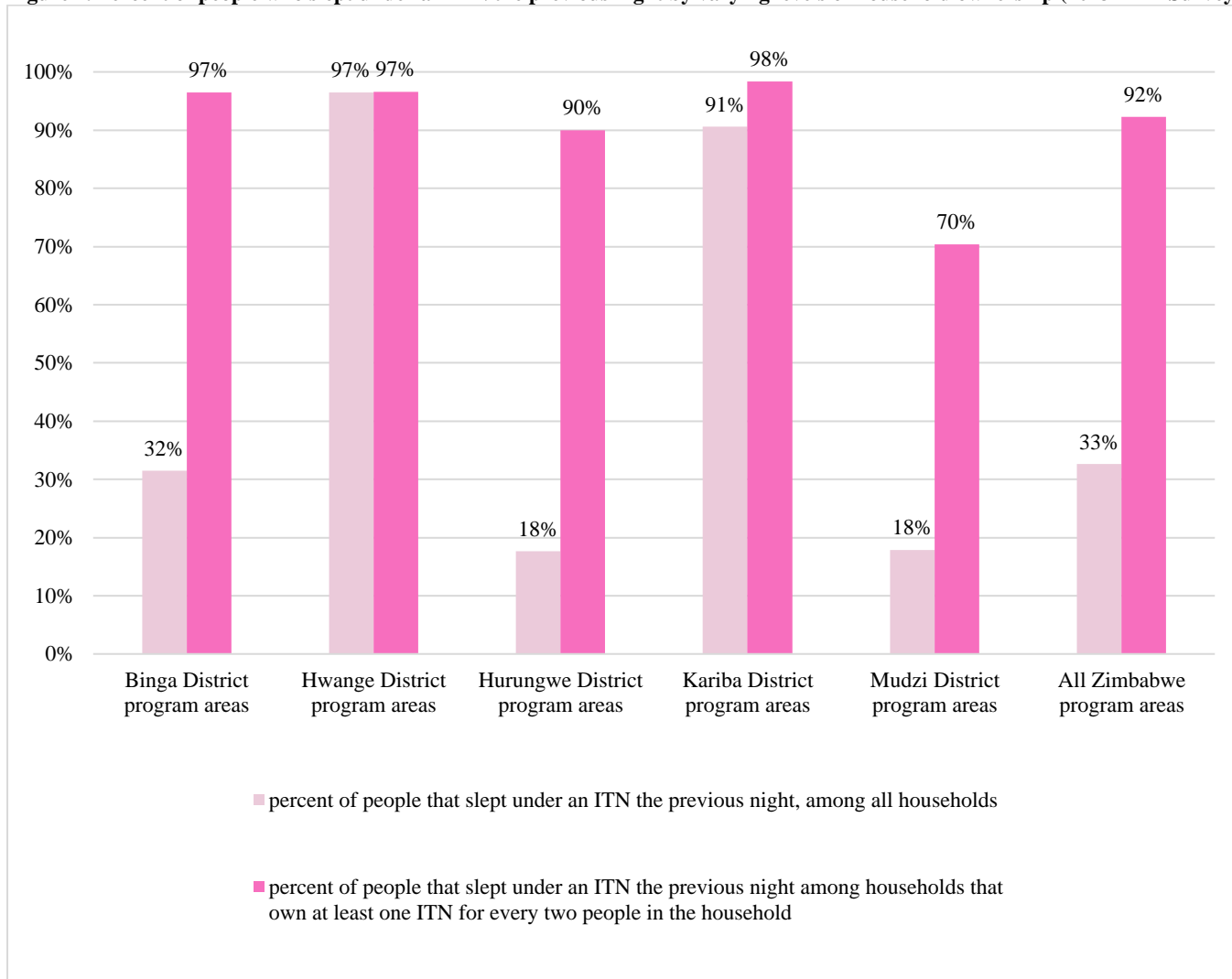
Figure 3. shows use of ITNs, which is the percent of people who slept under an ITN the previous night among all household members (household average), among pregnant women, and among children <5 (2023 KAP Survey). ITN use also follows the same patterns of ITN ownership and ITN access, suggesting that access to ITNs is a primary driver of their use. The percent of people who used an ITN the night before the survey is highest among program areas in Hwange District (96%) and Kariba District (91%), and considerably lower among program areas Binga District (32%), Hurungwe District (18%), and Mudzi District (18%). In most areas, pregnant women and children <5 slept under an ITN at slightly higher levels than the general population, suggesting that these higher-risk groups are correctly being prioritized to sleep under ITNs when there aren't enough ITNs to cover everyone in the household. However, pregnant women slept under an ITN at slightly lower levels than the general population in Hwange and Mudzi District program areas.

Figure 3. Percent of people (household average), percent of pregnant women, and percent of children <5 who slept under an ITN the previous night (2023 KAP Survey)



Across all Zimbabwe program areas, even among those areas with lower ITN use, most people who *did* have access to an ITN used it the previous night. Figure 4. Shows the proportion of people overall who slept under an ITN the previous night (among all households, regardless of their ITN ownership status) compared to the percent of people who slept under an ITN the previous night among only households that own at least one ITN for every two people in the household (2023 KAP Survey). Across all Zimbabwe program areas, 92% of people who had access to an ITN slept under it the night before the survey. However, there are still many people in Mudzi District (30%) who had access to an ITN in their household but did not sleep under it the previous night, suggesting room for behavior change in these program areas.

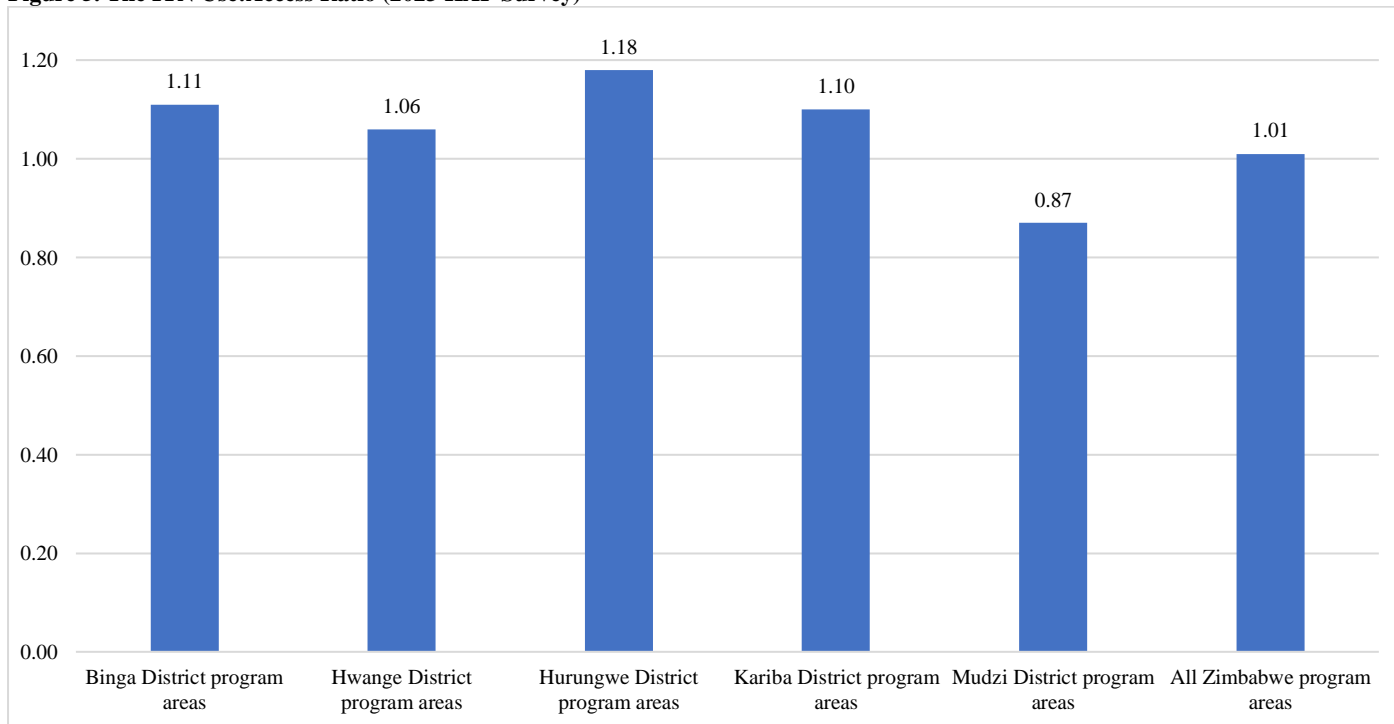
Figure 4. Percent of people who slept under an ITN the previous night by varying levels of household ownership (2023 KAP Survey)



The ITN Use:Access Ratio (Koenker and Kilian 2014) is a recommended indicator to better understand whether low ITN use (proportion of people who slept under an ITN the previous night) is due to a lack of the desired behavior of sleeping under an ITN that the household already owns, or due to lack of access to an ITN within the household. Ratios of ITN use to ITN access above 1.0 indicate that more than two people are sharing a net, on average. Ratios above 0.80 indicate that there is likely only a small amount of room for improvement in the behavior of sleeping under an ITN.

Figure 5 shows the ITN Use:Access Ratio from the 2023 KAP Survey. Across all Zimbabwe program areas, the ITN Use:Access Ratio was 1.01, indicating that all available ITN spaces were being used and, in many cases, more than two people were sleeping under an ITN. This suggests that desired ITN use behavior is high and most people will use ITNs if they have them, suggesting that the main driver of low overall ITN use is lack of access to ITNs. At the District level, Mudzi District had the lowest ratio at 0.87 indicating that there could be some room for behavior change improvement though the main focus to increase overall ITN use may need to be increasing access to ITNs.

Figure 5. The ITN Use:Access Ratio (2023 KAP Survey)

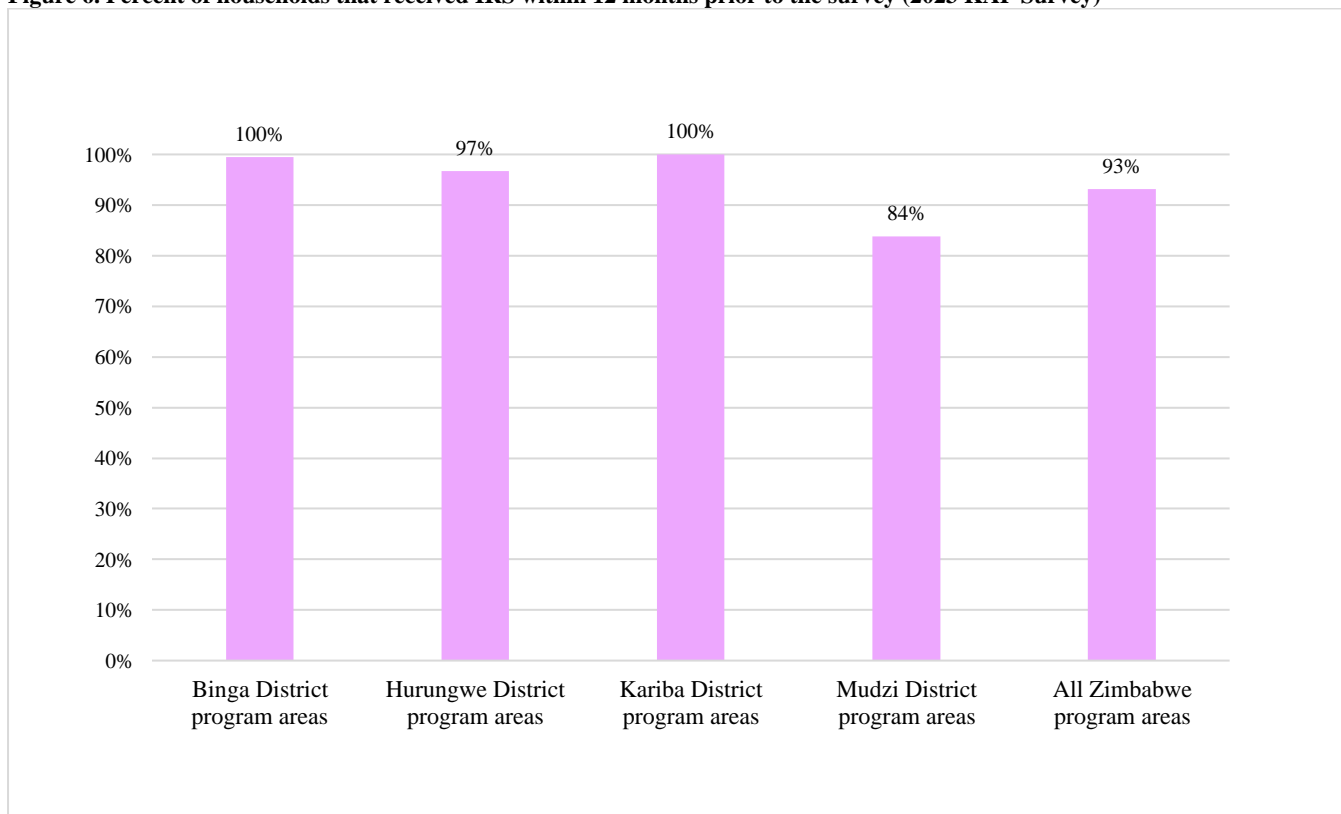


Indoor residual spraying (IRS)

Figure 6. shows the percent of households that reported receiving IRS within 12 months prior to the 2023 KAP Survey, among program areas within districts that were targeted to receive IRS within 12 months prior to the 2023 KAP Survey.

The World Health Organization indicates that at least 85% of households within a targeted area must receive IRS in order for IRS to be most effective. The 2023 KAP Survey results showed that past-12 month household IRS coverage reached the WHO-recommended level of $\geq 85\%$ among program areas in Binga (100%), Hurungwe (97%), and Kariba (100%) Districts, with Mudzi District program areas just below this benchmark (84%).

Figure 6. Percent of households that received IRS within 12 months prior to the survey (2023 KAP Survey)



If a respondent indicated that their household did not receive IRS within 12 months prior to the survey, they were asked why their household did not receive it. Among Mudzi District program areas, where household IRS coverage was lowest among the Zimbabwe program areas, 192 of the 1145 households surveyed did not receive IRS within 12 months prior to the 2023 KAP Survey. The most common reason given for not receiving IRS was “no one was at my household when the spray team came to offer IRS” (114/192). The second most common reason was “no one came to my household to offer IRS” (68/192).

Care-seeking behaviour

There are several key steps in the ideal trajectory of care for children under five years (<5) with fever: go to a health facility or community health worker (CHW) within 24 hours of fever onset, receive a malaria test, receive treatment if positive for malaria, and take the full course of the medication. Each step in the trajectory of care presents an opportunity for children to be “missed” and, therefore, for possible malaria infections to be left undiagnosed or untreated. The steps in the trajectory of care depend on both individual behavior and availability of health services. The trajectory of care cascade (Figure 7) helps to visualize the gaps within the care-seeking trajectory of children <5 with fever (2023 KAP Survey).

If respondents indicated that they were a mother or caregiver of a child <5, they were asked if their child had a fever within the previous two weeks and, if yes, about their child’s trajectory of care for that fever. The largest gap in the trajectory of care was seeking care within 24 hours of the start of the fever. Among respondents whose child <5 had a fever in the previous two weeks, 409/666 (76%) sought care from a health facility or CHW within 24 hours of the fever onset. The second largest gap in the trajectory of care was seeking care for the child’s fever at all (regardless of where care was sought or the time frame relative to the fever onset). Among respondents whose child <5 had a fever in the previous two weeks, 569/666 (85%) sought care for the child’s fever.

Figure 7. Number of children at each step in the trajectory of care cascade for children <5 with fever within the two weeks prior to the survey, across all Zimbabwe program areas (2023 KAP Survey)

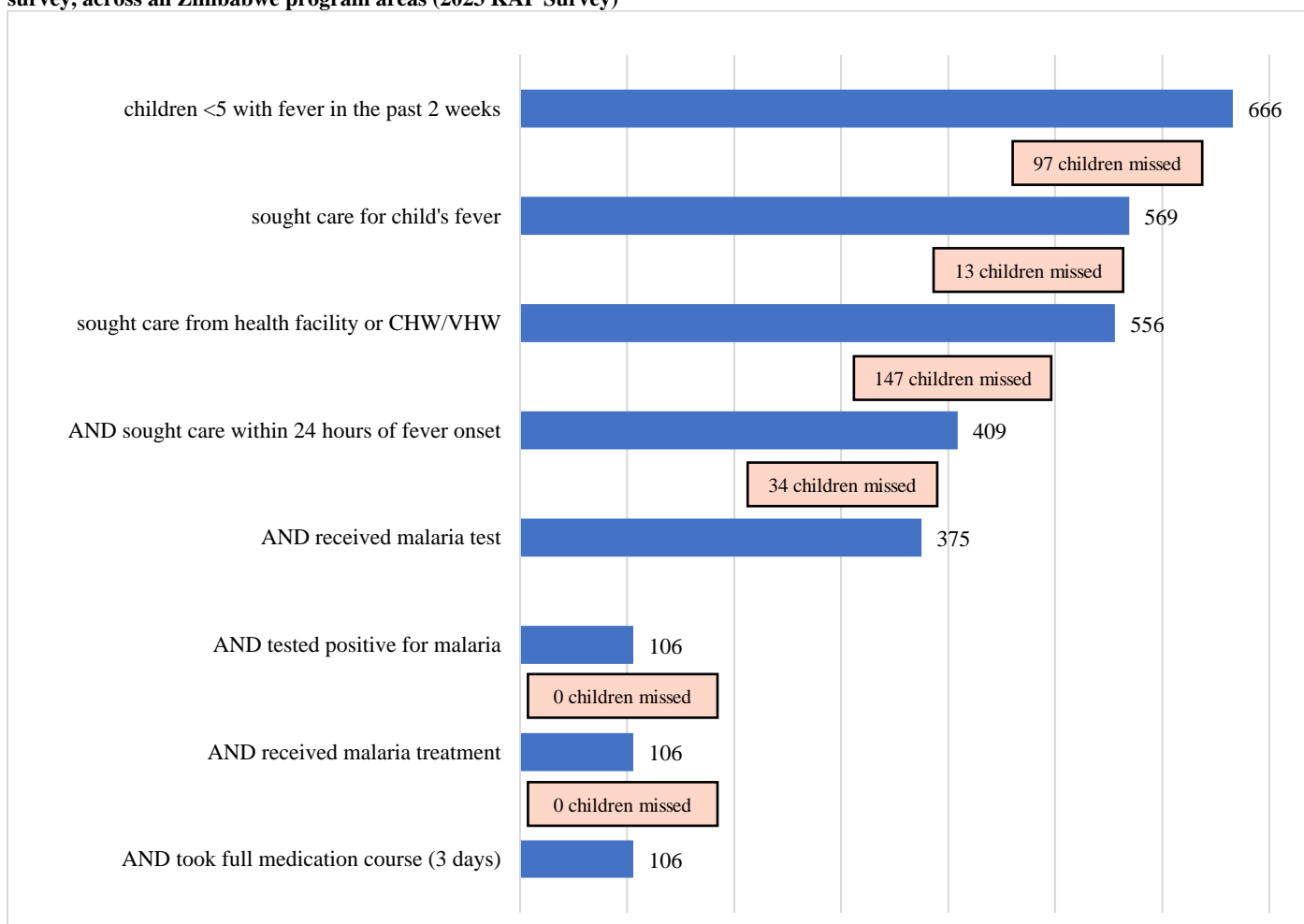


Table 5. shows the three key indicators of the trajectory of care for children <5 with fever across all Zimbabwe program areas: 1) the proportion of children <5 with fever who sought care within 24 hours of fever onset; 2) the proportion who received a malaria test among those who sought care from a health facility or CHW; and 3) the proportion who received malaria treatment among those who tested positive for malaria. Statistically significant changes are denoted by arrows and p-values. Across all Zimbabwe program areas, the proportion of children <5 with fever in the two weeks prior to the survey who sought care from a health facility or CHW within 24 hours of the start of the fever increased significantly between 2022-2023, from 58% to 65% (p=0.015). The proportion of children <5 with fever in the past two weeks that received a malaria test, among those who sought care from a health facility or CHW, also increased significantly between 2022-2023, from 88% to 92% (p=0.042). The proportion of children who received Coartem for treatment of malaria, among those who reportedly tested positive for malaria, has remained 100% between 2021-2023.

Table 5. Key indicators in the trajectory of care for children <5 with fever in the prior two weeks (%), across all Zimbabwe program areas (2021-2023 KAP Surveys)

	2021	2022	2023
Percent of children <5 with fever in the prior 2 weeks who sought care from a health facility or CHW within 24 hours of fever onset	62%	58%	65% ↑ (p=0.015)
Percent of children <5 with fever in the prior 2 weeks who received a malaria test, among those who sought care from a health facility or CHW	84%	88%	92% ↑ (p=0.042)
Percent of children <5 with fever in the prior 2 weeks that received malaria treatment, among those who tested positive for malaria	100%	100%	100%

Intermittent preventive treatment of malaria in pregnancy (IPTp)

Table 6. shows the proportion of women that reported taking three or more (3+) doses of IPTp during their pregnancy, among those who gave birth within 12 months prior to the 2023 KAP Survey. Significant changes from the previous survey year are denoted by arrows and p-values. In some program areas, the subsample of respondents who gave birth within 12 months prior to the survey is small and therefore results should be interpreted with caution (see the middle column for denominators used to calculate percentages). Program areas within Binga, Hwange, and Mudzi Districts showed a statistically significant increase in the proportion of women who gave birth in the prior 12 months that took 3+ doses of IPTp, compared to the prior survey year.

Table 6. Percent of women who took 3+ doses of IPTp during their pregnancy, among those who gave birth in the 12 months prior to the survey (2023 KAP Survey)

Program areas within Districts	Number of respondents who gave birth within 12 months prior to the 2023 KAP Survey (n)	Percent of women who gave birth in the previous 12 months that took 3+ doses of IPTp during pregnancy (%)	
		2022	2023
Binga	168	87%	94% ↑ (0.038)
Hwange	48	86%	100% ↑ (p=0.014)
Hurungwe	16	77%	88%
Kariba	9	87%	90%
Mudzi	182	58%	70% ↑ (p=0.021)
All Zimbabwe program areas	423	74%	84% ↑ (p=<0.001)

Knowledge and attitudes

Respondents were asked questions pertaining to their knowledge of malaria symptoms and cause. Figure 8. shows the proportion of respondents who identified “fever/chills” as a symptom of malaria from 2022-2023. Statistically significant changes from the previous year are denoted by bold numbers. Across all Zimbabwe program areas, 95% of respondents correctly identified “fever/chills” as a symptom of malaria. Among program areas in Binga District, there was a statistically significant increase in this indicator between 2022-2023 (p=0.017).

Figure 8. Percent of respondents who correctly identified “fever/chills” as a symptom of malaria (2022-2023 KAP Surveys)

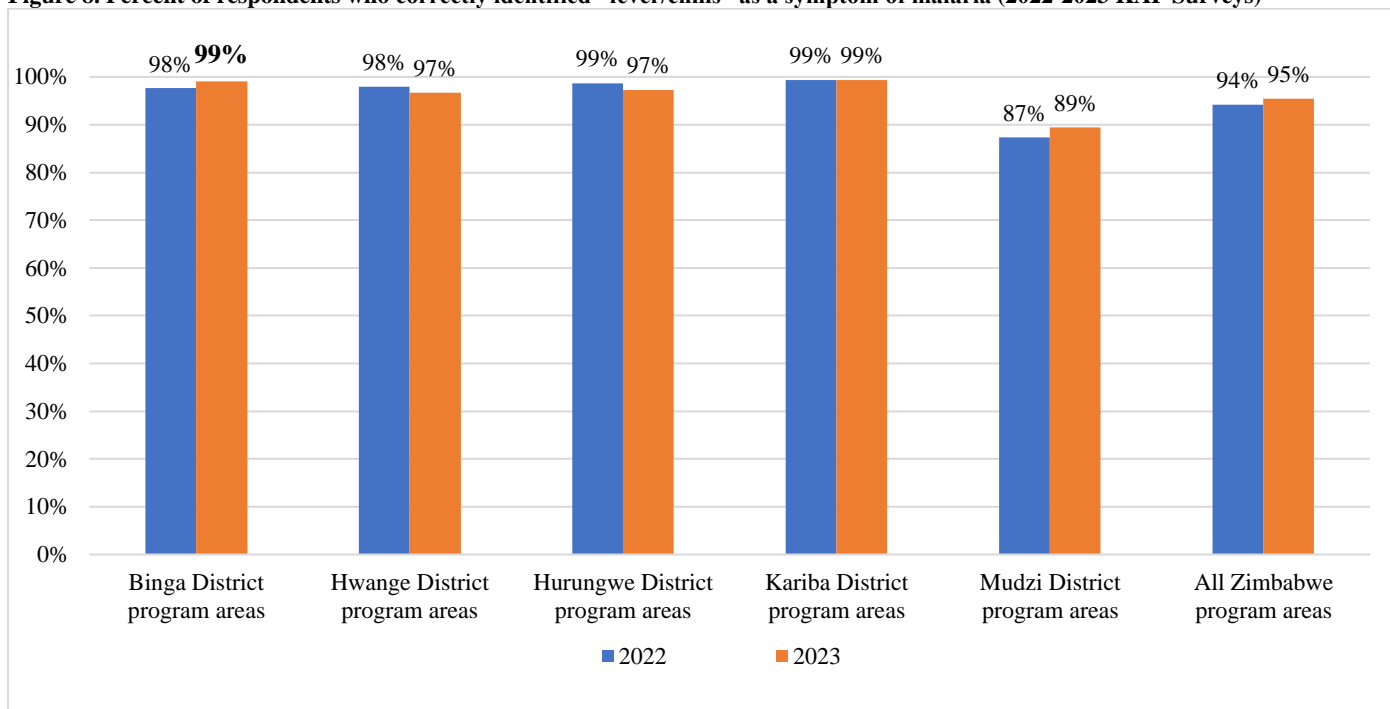
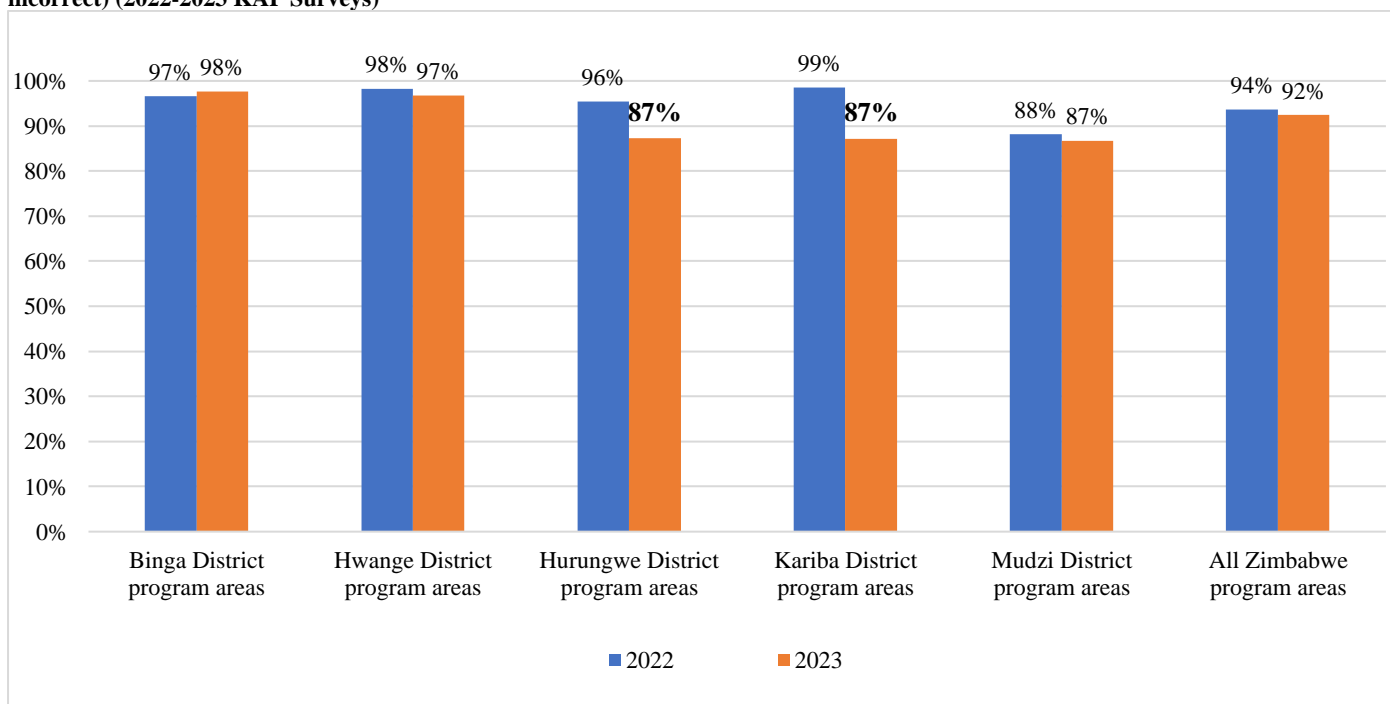


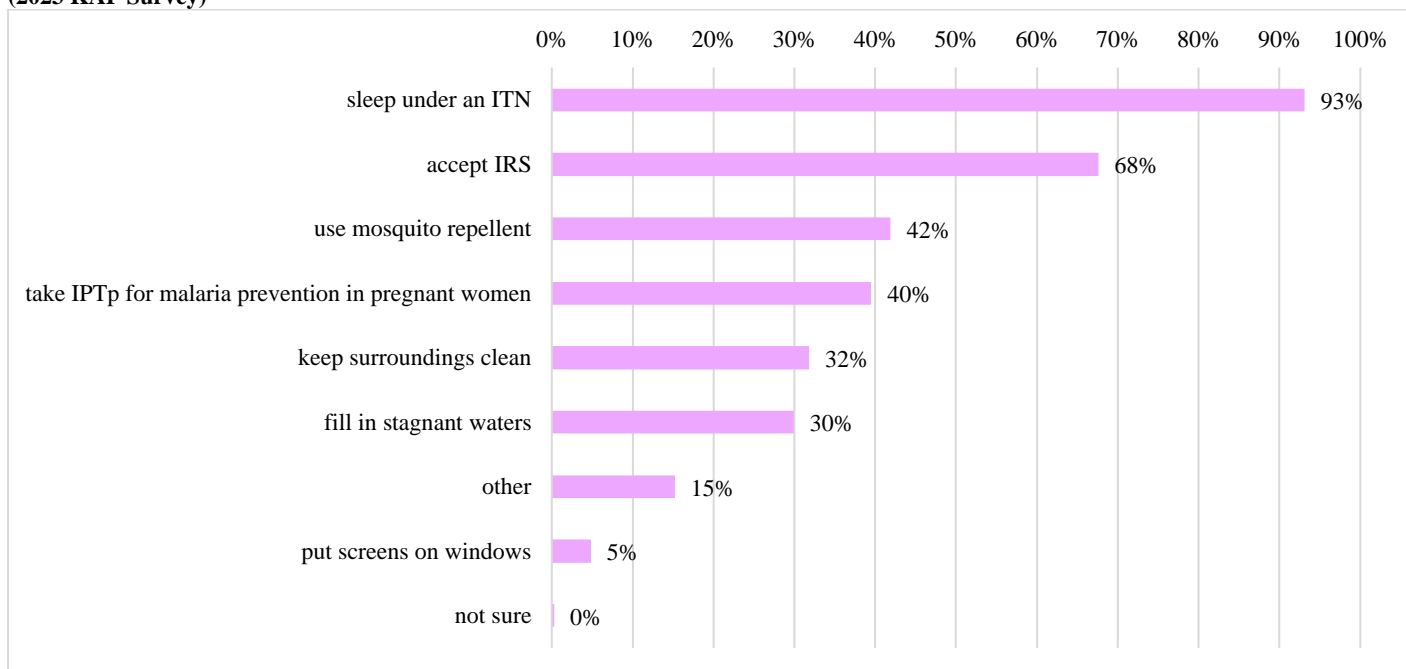
Figure 9. shows the proportion of respondents who identified the mosquito as the cause of malaria and mentioned nothing else incorrect (such as eating unripe fruit or getting soaked in the rain). Statistically significant changes from the previous year are denoted by bold numbers. Across all Zimbabwe program areas, 92% of respondents correctly identified the mosquito as the cause of malaria. However, between 2022 – 2023 there were statistically significant decreases in this indicator among program areas in Hurungwe (p=0.019) and Kariba (p=0.003) Districts.

Figure 9. Percent of respondents who correctly identified the mosquito as the cause of malaria transmission (and mentioned nothing else incorrect) (2022-2023 KAP Surveys)



Respondents were asked if they believed there were actions that one could take to help prevent malaria infection. Those who believed so were then asked to list off the actions / things that could help prevent malaria, shown in Figure 10 (2023 KAP Survey). Most respondents mentioned “sleeping under an ITN” (93%). The second most mentioned action was to “accept IRS” (68%).

Figure 10. Percent of respondents that listed various protective measures when asked what one can do to protect oneself from malaria (2023 KAP Survey)



Respondents were asked whether they believed that ITNs, IRS, and IPTp “helps a lot,” “helps a little,” or “does not help” to prevent malaria. Table 7. shows these results from 2022-2023 KAP Surveys. Statistically significant changes from the previous year are denoted by arrows and p-values. In general, most participants believed that all three of these interventions “help a lot” to prevent malaria. Between 2022-2023, the proportion of respondents who believed that IRS “helps a lot” to prevent malaria increased significantly, from 84% to 90% ($p < 0.001$).

Table 7. Percent of respondents that believe that ITNs, IRS, and IPTp “help a lot” to prevent malaria, all Zimbabwe program areas (2022-2023 KAP Surveys)

Indicator	2022	2023
Think that ITNs “help a lot” to prevent malaria	95%	95%
Think that IRS “helps a lot” to prevent malaria	84%	90% ↑ ($p < 0.001$)
Think that IPTp “helps a lot” to prevent consequences of malaria in pregnancy	94%	95%

Appendix 1. 2023 KAP Survey sampling frame (IFCBMI Zimbabwe program areas)

Province	District	Ward	Village	Received IRS within 12 months prior to 2023 KAP Survey	Received ITNs within 12 months prior to 2023 KAP Survey
Mashonaland West	Hurungwe	Kazangarare	Zuze	Yes (Dec 2022)	
			Mhurupuru	Yes (Dec 2022)	
			Kazangare	Yes (Dec 2022)	
			Kaunda	Yes (Dec 2022)	
		Dete	Masokoti	Yes (Dec 2022)	
			Maendaenda	Yes (Dec 2022)	
			Nyachowe	Yes (Dec 2022)	
			Chidimure	Yes (Dec 2022)	
		Chibara	Maendaenda B	Yes (Dec 2022)	
			Mugwagwa	Yes (Dec 2022)	
			Raisi	Yes (Oct 2022)	
			Nyatsona	Yes (Oct 2022)	
			Makuni	Yes (Oct 2022)	
		Chundu	Musokeri	Yes (Oct 2022)	
			Chigwida	Yes (Oct 2022)	
			Mutowa	Yes (Oct 2022)	
			Ranjisi Village 4	Yes (Jan 2023)	
		Masanga	Kanhuwa	Yes (Jan 2023)	
			Chinhema	Yes (Jan 2023)	
			Chipokeni	Yes (Jan 2023)	
			Madhumba	Yes (Jan 2023)	
		Nyamakate	Nyikadzino	Yes (Jan 2023)	
			Nziramasanga	Yes (Jan 2023)	
			Murisa	Yes (Jan 2023)	
			Manguwe	Yes (Jan 2023)	
		Chirundu	Mutemachani	Yes (Jan 2023)	
			Charlle	Yes (Nov 2022)	
			Lima	Yes (Nov 2022)	
			Golf A	Yes (Nov 2022)	
			Papa	Yes (Nov 2022)	
		Deve	31A	Yes (Nov 2022)	
			Alpha A	Yes (Nov 2022)	
			Murimbika	Yes (Nov 2022)	
			Valley	Yes (Nov 2022)	
		Kariba	Heights	Yes (Nov 2022)	
			Estates	Yes (Nov 2022)	
			Musiiwa	Yes Dec (2022)	
			Mhosva	Yes Dec (2022)	
		Chalala	Kapesa	Yes Dec (2022)	
			Matonhedze	Yes Dec (2022)	
	Village 9		Yes (Nov 2022)		
	Chitenge		Yes (Nov 2022)		
	Mayovhe	Mangwara	Yes (Dec 2022)		
		Dove	Yes (Dec 2022)		
		Mayovhw fishing camp	Yes (Dec 2022)		
		Mazambuko	Yes (Dec 2022)		
	Negande	Sianungu	Yes (Dec 2022)		
		Jongola	Yes (Dec 2022)		
		Seremwe	Yes (Jan 2023)		
		Malaiti	Yes (Jan 2023)		
Matabeleland North	Binga North	Sinakoma	Guyu	Yes (Jan 2023)	
			Matala	Yes (Oct 2022)	
			Chivwetu	Yes (Oct 2022)	
			Dongamuse	Yes (Oct 2022)	
			Kalamba	Yes (Oct 2022)	
			Nsungwale	Yes (Oct 2022)	
		Chunga/22	Nampande	Yes (Oct 2022)	
			Chininga	Yes (Oct 2022)	
			Sianyanga	Yes (Oct 2022)	
			Bbotela	Yes (Nov 2022)	
	Lunga/1	Njobola	Yes (Nov 2022)		
		Sinamwenda	Yes (Nov 2022)		
		Siakanchele	Yes (Nov 2022)		
		Tyaba	Yes (Nov 2022)		
		Sinakatenge	Yes (Nov 2022)		
		Sinamunsanga	Yes (Nov 2022)		
	Sinansengwe/5	Lunga	Yes (Nov 2022)		
		Nsengwa	Yes (Nov 2022)		
		Chipampa	Yes (Nov 2022)		
		Mujele	Yes (Nov 2022)		
Sinansengwe/5	Keja	Yes (Nov 2022)			
	Mucheni	Yes (Nov 2022)			
	Sikabinga	Yes (Nov 2022)			
	Mbalule	Yes (Nov 2022)			
	Zuka	Yes (Nov 2022)			
			Makondo	Yes (Nov 2022)	

Province	District	Ward	Village	Received IRS within 12 months prior to 2023 KAP Survey	Received ITNs within 12 months prior to 2023 KAP Survey	
			Chitete	Yes (Nov 2022)		
			Mwenda	Yes (Nov 2022)		
		Manjolo	Malinda	Yes (Nov 2022)		
			Siangwemu	Yes (Oct 2022)		
			Manjolo	Yes (Oct 2022)		
			Nalubuyu	Yes (Oct 2022)		
			Simatelele	Chileya	Yes (Oct 2022)	
				Masawu	Yes (Nov 2022)	
				Zingozi	Yes (Nov 2022)	
				Kasikili	Yes (Nov 2022)	
				B/Kraal	Yes (Nov 2022)	
				Lokola	Yes (Nov 2022)	
			Siansundu	Siameja	Yes (Nov 2022)	
				Chijalamatanga	Yes (Nov 2022)	
				Sianjomwa	Yes (Nov 2022)	
				Minsale	Yes (Nov 2022)	
				Miimpo	Yes (Nov 2022)	
				Siavwandu	Yes (Nov 2022)	
				Kadika	Yes (Nov 2022)	
				Mimbo	Yes (Nov 2022)	
		Simwenge		Yes (Nov 2022)		
		Milbizi		Yes (Nov 2022)		
		Lubanda	Makunku	Yes (Jan 2023)		
			Katete	Yes (Jan 2023)		
			Chesamba	Yes (Jan 2023)		
			Lubanda	Yes (Jan 2023)		
		Saba	Kenjobo	Yes (Nov 2022)		
			Siamusale	Yes (Nov 2022)		
			Kamalumbu	Yes (Nov 2022)		
			Sicimvwali	Yes (Nov 2022)		
			Mupambe	Yes (Nov 2022)		
			Chabumbulukwa	Yes (Nov 2022)		
			Mabhonga	Yes (Nov 2022)		
		Siachilaba	Saba	Yes (Nov 2022)		
			Siantungwani	Yes (Nov 2022)		
			Siamwinde 1	Yes (Nov 2022)		
			Siamwinde 2	Yes (Nov 2022)		
			Chumpamanda	Yes (Nov 2022)		
			Siansise 1	Yes (Nov 2022)		
		Sikalenge	Siansise 2	Yes (Nov 2022)		
			Sianoti	Yes (Nov 2022)		
			Msenampongo	Yes (Oct 2022)		
			Sikalenge	Yes (Oct 2022)		
			Damba	Yes (Oct 2022)		
			Siabbanga	Yes (Oct 2022)		
		Hwange	Dete	Mangogo	Yes (Oct 2022)	
				Delampuli	Yes (Oct 2022)	
				Kelamenda	Yes (Oct 2022)	
				Bote 1		Yes (Aug 2022)
				Bote 2		Yes (Aug 2022)
				NRZ 1		Yes (Aug 2022)
			Kamativi	NRZ 2		Yes (Aug 2022)
				Soweto		Yes (Aug 2022)
				Mtuya 1		Yes (Aug 2022)
				Mtuya 2		Yes (Aug 2022)
				Chikanga & "B6" Section		Yes (Aug 2022)
				"A" Section		Yes (Aug 2022)
				"B" & "C" Section		Yes (Aug 2022)
				"CB" & "D" Section		Yes (Aug 2022)
				Village 21		Yes (Aug 2022)
Ndumichenga (Mulonga)				Yes (Aug 2022)		
Sena FM				Yes (Aug 2022)		
Ndumichenga				Yes (Aug 2022)		
Mwemba	Katete			Yes (Aug 2022)		
	Village 22			Yes (Aug 2022)		
	Sena			Yes (Aug 2022)		
	Lwaanzi			Yes (Aug 2022)		
	Shashachunda			Yes (Aug 2022)		
	Mashala Top			Yes (Aug 2022)		
Simangani	Kalisonde			Yes (Aug 2022)		
	Mugambo			Yes (Aug 2022)		
	Jejeti			Yes (Aug 2022)		
	Mwemba			Yes (Aug 2022)		
Jambezi	Simangani		Yes (Aug 2022)			
	Makwa 1		Yes (Aug 2022)			
	Makwa 2		Yes (Aug 2022)			
	chezya		Yes (Aug 2022)			
	Chenje 1		Yes (Aug 2022)			
		Tamuka		Yes (Aug 2022)		

Province	District	Ward	Village	Received IRS within 12 months prior to 2023 KAP Survey	Received ITNs within 12 months prior to 2023 KAP Survey
			Nyikanyoro		Yes (Aug 2022)
			Zhulandangalilo 2		Yes (Aug 2022)
			Jambezi centre		Yes (Aug 2022)
			Chenje 2		Yes (Aug 2022)
			Chenjiri		Yes (Aug 2022)
			Bupenyubwamangwana		Yes (Aug 2022)
			Manono		Yes (Aug 2022)
			Chikamba		Yes (Aug 2022)
			Zhulandangalilo 1		Yes (Aug 2022)
			Ndimakule		Yes (Aug 2022)
Tazupila		Yes (Aug 2022)			
Mashonaland East	Mudzi	Chikwizo A	Amoni	Yes (Nov 2022)	
			Arongani	Yes (Nov 2022)	
			Chakuposhiwa	Yes (Nov 2022)	
			Chando	Yes (Nov 2022)	
			Chikuyeni	Yes (Nov 2022)	
			Dakati	Yes (Nov 2022)	
			Dick	Yes (Nov 2022)	
			Gasani	Yes (Nov 2022)	
			Joromani	Yes (Nov 2022)	
			Kajawo	Yes (Nov 2022)	
			Kamutoto	Yes (Nov 2022)	
			Kanyoka 1	Yes (Nov 2022)	
			Kanyoka 3	Yes (Nov 2022)	
			Kanyoka 4	Yes (Nov 2022)	
			Kudyakunopeta	Yes (Nov 2022)	
			Machisa	Yes (Nov 2022)	
			Manyangarirwa	Yes (Nov 2022)	
			Maonera	Yes (Nov 2022)	
			Marusi	Yes (Nov 2022)	
			Masewo	Yes (Nov 2022)	
			Mazonde	Yes (Nov 2022)	
			Mubweza	Yes (Nov 2022)	
			Mupingiza	Yes (Nov 2022)	
			Mutize	Yes (Nov 2022)	
			Muyembe	Yes (Nov 2022)	
			Nyabanga	Yes (Nov 2022)	
			Nyambo	Yes (Nov 2022)	
			Nyamukacha	Yes (Nov 2022)	
			Nyandoro	Yes (Nov 2022)	
			Tembo	Yes (Nov 2022)	
			Tubu	Yes (Nov 2022)	
			Zambezi	Yes (Nov 2022)	
		Zano	Yes (Nov 2022)		
		Zinhu	Yes (Nov 2022)		
		Gorongwa A	Botso	Yes (Nov 2022)	
			Charambadeya	Yes (Nov 2022)	
			Chikungwa	Yes (Nov 2022)	
			Josi	Yes (Nov 2022)	
			Kasuso	Yes (Nov 2022)	
			Katakura	Yes (Nov 2022)	
			Makosa	Yes (Nov 2022)	
			Marovha	Yes (Nov 2022)	
			Mbwadzi	Yes (Nov 2022)	
			Mudzimu	Yes (Nov 2022)	
			Mukombwe	Yes (Nov 2022)	
			Mukuramimba	Yes (Nov 2022)	
			Mutamangira	Yes (Nov 2022)	
			Mutekede	Yes (Nov 2022)	
			Mutesva	Yes (Nov 2022)	
			Mutoko	Yes (Nov 2022)	
			Muvhiza	Yes (Nov 2022)	
			Nyahuna	Yes (Nov 2022)	
			Nyakupata	Yes (Nov 2022)	
			Tsonga	Yes (Nov 2022)	
			Tsonga A	Yes (Nov 2022)	
			Tsonga B	Yes (Nov 2022)	
			Gorongwa B	Chingwena	Yes (Nov 2022)
Gorohoro	Yes (Nov 2022)				
Jeke	Yes (Nov 2022)				
Kanobata	Yes (Nov 2022)				
Kasuso 2	Yes (Nov 2022)				
Mafuta	Yes (Nov 2022)				
Mavhura	Yes (Nov 2022)				
Mupatiseni	Yes (Nov 2022)				
Mututa	Yes (Nov 2022)				
Muwadzi	Yes (Nov 2022)				
Tangi	Yes (Nov 2022)				
Tizora	Yes (Nov 2022)				

Province	District	Ward	Village	Received IRS within 12 months prior to 2023 KAP Survey	Received ITNs within 12 months prior to 2023 KAP Survey	
		Mukota D	Barichoro	Yes (Nov 2022)		
			Bvunzawabaya	Yes (Nov 2022)		
			Chamburuka	Yes (Nov 2022)		
			Charamba	Yes (Nov 2022)		
			Chibedura	Yes (Nov 2022)		
			Chigan'a	Yes (Nov 2022)		
			Chimuramba	Yes (Nov 2022)		
			Chimutsanya	Yes (Nov 2022)		
			Jigu	Yes (Nov 2022)		
			Kambeva	Yes (Nov 2022)		
			Kamburanyanga	Yes (Nov 2022)		
			Kanyimo	Yes (Nov 2022)		
			Kungwengwe	Yes (Nov 2022)		
			Kurima	Yes (Nov 2022)		
			Magohoto	Yes (Nov 2022)		
			Maruza	Yes (Nov 2022)		
			Mombemuriwo	Yes (Nov 2022)		
			Murapura	Yes (Nov 2022)		
			Musau	Yes (Nov 2022)		
			Mususa	Yes (Nov 2022)		
			Mutinha	Yes (Nov 2022)		
			Nyamande	Yes (Nov 2022)		
			Nyamudandara	Yes (Nov 2022)		
			Nyamutin'a	Yes (Nov 2022)		
			Ranja	Yes (Nov 2022)		
			Rupiya	Yes (Nov 2022)		
			Saizi	Yes (Nov 2022)		
			Takuranaho	Yes (Nov 2022)		
		Tsabora	Yes (Nov 2022)			
		Zongoro	Yes (Nov 2022)			
		Mukota A	Rongani	Yes (Nov 2022)		
			Chiringa	Yes (Nov 2022)		
			Zhuwau 1	Yes (Nov 2022)		
			Zhuwau 2	Yes (Nov 2022)		
			Nyabonde	Yes (Nov 2022)		
			Katena 1	Yes (Nov 2022)		
			Katena 2	Yes (Nov 2022)		
			Katena 3	Yes (Nov 2022)		
			Katena 4	Yes (Nov 2022)		
			Mbeko	Yes (Nov 2022)		
			Kamutondore	Yes (Nov 2022)		
			Nyamhimvu A	Yes (Nov 2022)		
			Nyamhimvu B	Yes (Nov 2022)		
			Chikoko	Yes (Nov 2022)		
			Dzidzi 1	Yes (Nov 2022)		
			Dzidzi 2	Yes (Nov 2022)		
			Madzinga	Yes (Nov 2022)		
			Kachepa	Yes (Nov 2022)		
			Kasere 1	Yes (Nov 2022)		
			Karumba 1	Yes (Nov 2022)		
			Makaza 1	Yes (Nov 2022)		
			Makaza 2	Yes (Nov 2022)		
			Chanetsa 1	Yes (Nov 2022)		
			Nyarongo	Yes (Nov 2022)		
			Magohoto 2	Yes (Nov 2022)		
			Magohoto 3	Yes (Nov 2022)		
			Masahwa	Zano masahwa	Yes (Nov 2022)	
				Tsekese	Yes (Nov 2022)	
		chimwara		Yes (Nov 2022)		
		Kambanje		Yes (Nov 2022)		
		Bvunzawabaya		Yes (Nov 2022)		
		Mushonga		Yes (Nov 2022)		
		Tembo		Yes (Nov 2022)		
		Makanjera		Yes (Nov 2022)		
		Champion		Yes (Nov 2022)		
		Mare		Yes (Nov 2022)		
		Chibanzu		Yes (Nov 2022)		
		Chiwaka		Yes (Nov 2022)		
		Takwanisa		Yes (Nov 2022)		
		Chiringa		Yes (Nov 2022)		
		Chinogurei		Yes (Nov 2022)		
		Nyakutira		Yes (Nov 2022)		
		Nyamhanza		Yes (Nov 2022)		
		Tambudze		Yes (Nov 2022)		
		Gatakata		Yes (Nov 2022)		
		Ngwaru		Yes (Nov 2022)		
		Sarauchirehwa	Yes (Nov 2022)			
		Chikona	Yes (Nov 2022)			
		Revai	Yes (Nov 2022)			

Province	District	Ward	Village	Received IRS within 12 months prior to 2023 KAP Survey	Received ITNs within 12 months prior to 2023 KAP Survey
			Tigere	Yes (Nov 2022)	
			Panganai	Yes (Nov 2022)	
			Solomon	Yes (Nov 2022)	
			Marikopo	Yes (Nov 2022)	
			Katsande	Yes (Nov 2022)	
			Kachara	Yes (Nov 2022)	
			Muocha	Yes (Nov 2022)	
			Kakore	Yes (Nov 2022)	
		Chikwizo B	Musaruro	Yes (Nov 2022)	
			Navhaya	Yes (Nov 2022)	
			Mazowe	Yes (Nov 2022)	
			Kapoto	Yes (Nov 2022)	
			Tera	Yes (Nov 2022)	
			Chiwaka	Yes (Nov 2022)	
			Mudapakati	Yes (Nov 2022)	
			Spanera	Yes (Nov 2022)	
			Teketeke1	Yes (Nov 2022)	
			Teketeke2	Yes (Nov 2022)	
			Teketeke3	Yes (Nov 2022)	
			Ndamba	Yes (Nov 2022)	
			Kanofema	Yes (Nov 2022)	
			Chimango	Yes (Nov 2022)	
			Taona	Yes (Nov 2022)	
			Mutedza	Yes (Nov 2022)	
			Kamubarazina	Yes (Nov 2022)	
			Mupaso	Yes (Nov 2022)	
			Matasva	Yes (Nov 2022)	
			Mushamba	Yes (Nov 2022)	
			Zavhedo1	Yes (Nov 2022)	
			Zavhedo 2	Yes (Nov 2022)	
			Chikonyora	Yes (Nov 2022)	
		Nyamusa	Yes (Nov 2022)		
		Chamburuka	Yes (Nov 2022)		

Appendix 2. References

Koenker, Hannah, and Albert Kilian. 2014. "Recalculating the Net Use Gap: A Multi-Country Comparison of ITN Use versus ITN Access." *PLoS One* 9(5): e97496.